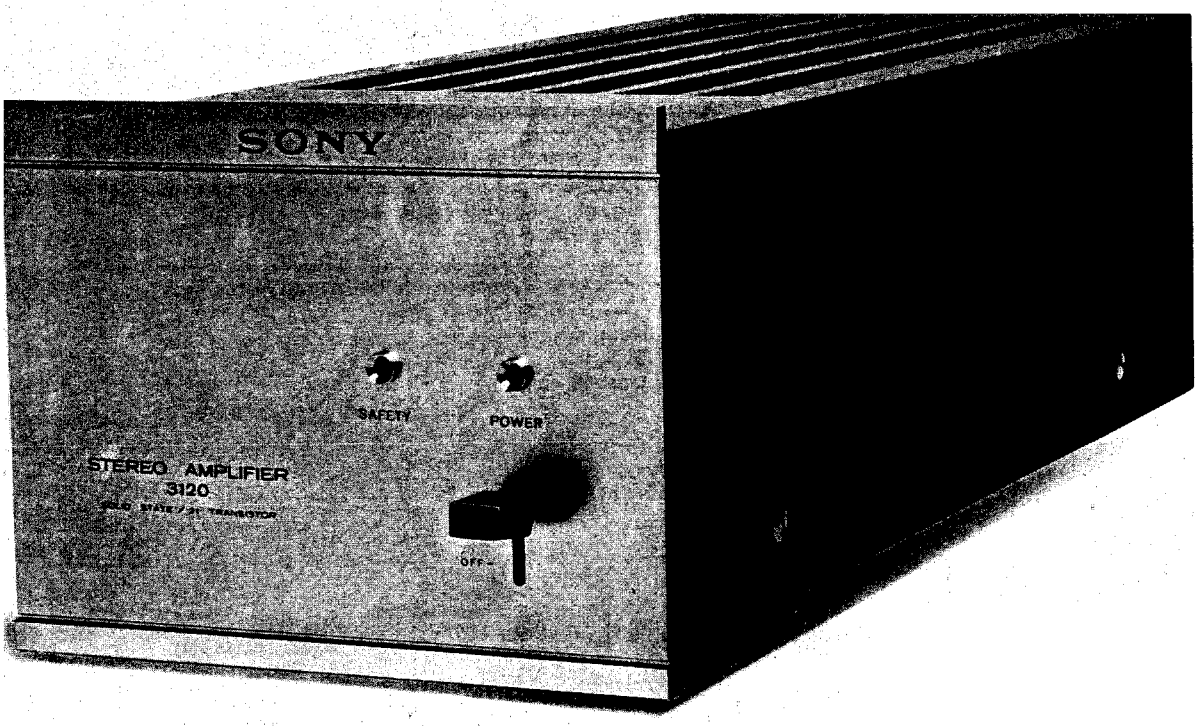
TA-3120



Specifications (1)

System : All Silicon Transistor stereo amplifier

Circuit : Quasi-complementary symmetry circuit

Transistor : 2SC401 (4), 2SC293 (2), 2SC299 (5), 2SD45 (8), 2SA527 (2)

Diode : DS2M (4), S2C (2), 1T206 (10), SV6 (4), 2SF-103 (SCR) (1)

Power requirement : AC 100, 117, 220, 240V, 50/60 Hz

Power consumption : Approx. 30W at zero signal

Approx. 250W at rated output

Dimension : 180 (W)×145 (H)×445mm (D) (7⅛×5¾×17½″)

Weight : Approx. 8 kgs. (17 lbs, 10 ozs.)

SONY®
SERVICING GUIDE

Specifications (2)

Power output : Non-clip music power : 160W both channels (8 ohms)
Music power(IHFM) : 120W both channels (8 ohms) ±0.5 db
Rated output : 50W per channel (8 ohms) ±0.5 db
35W per channel (16 ohms) ±0.5 db

Harmonic distortion : At 1 KHz : Less than 0.1% at rated output
Less than 0.07% at 25W output
Less than 0.05% at 500mW output
At 20 Hz - 80 KHz : Less than 0.5% at rated output.

Intermodulation distortion : Less than 0.3% at rated output, 70 Hz : 7 KHz 4 : 1
(SMPTE)

Frequency response : Normal : 30 Hz - 100 KHz $^{+0}_{-1}$ db at rated output

Test : 10 Hz - 100 KHz $^{+0}_{-1}$ db at rated output

S/N : Closed circuit 110 db (IHFM)
*through weighted network as per ASAZ 24.3 - 1944 (40 db-A)

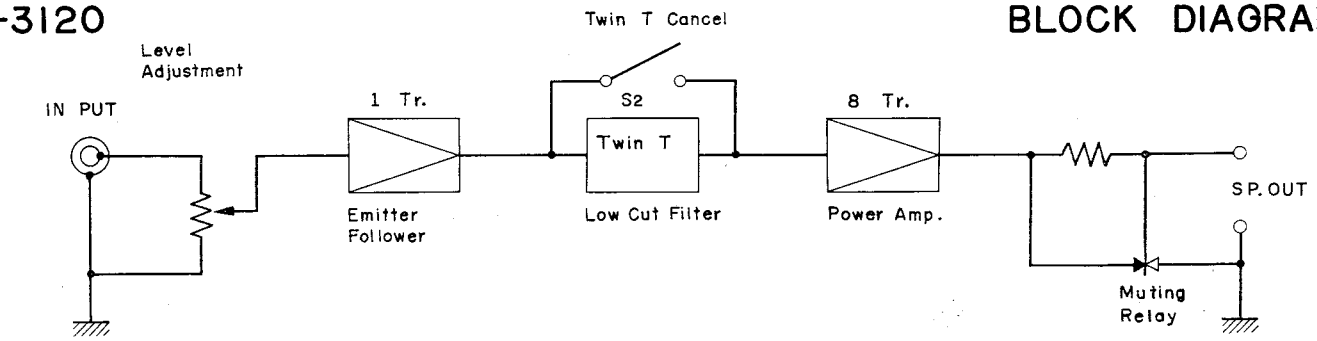
Input impedance : More than 100 k ohms

Damping factor : More than 70 at 1 KHz (8 ohms load)

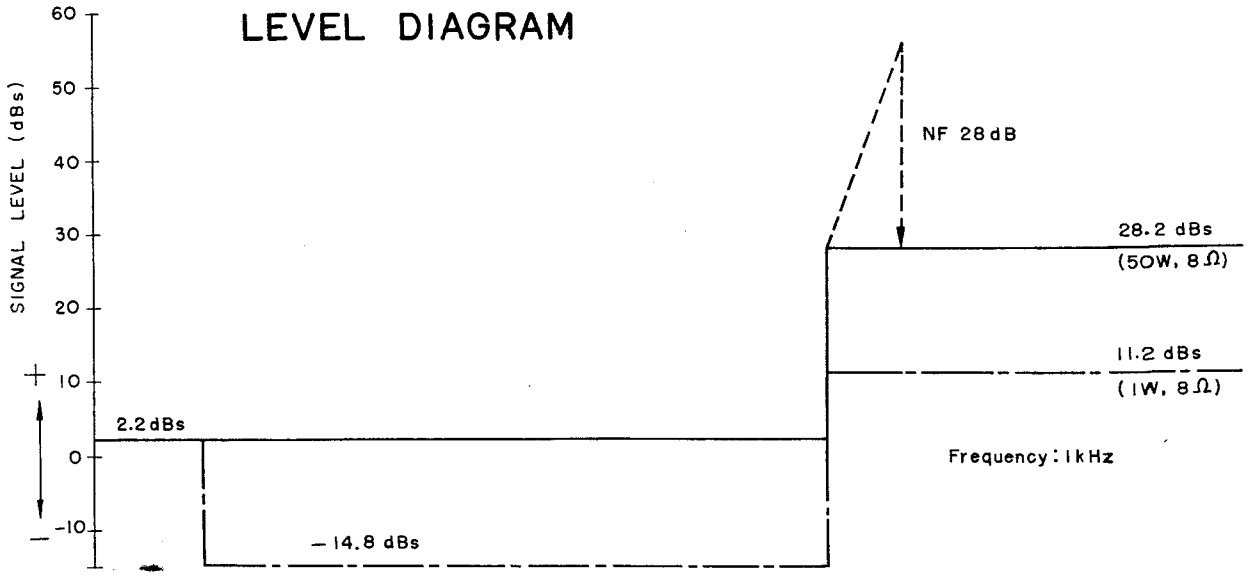
Sensitivity : 1V for 50W output

Rear panel facilities : Input level adjusting screws (semi-fixed)
Low-cut filter switch
Input (2) : Phono type jacks. Accept outputs from Preamplifier
Output (4) : Speaker terminals. Match speakers having
8 - 16 ohm impedance
Grounding terminal
AC outlet : Switched (2)
Unswitched (1)

TA-3120 BLOCK DIAGRAM



LEVEL DIAGRAM



Warm-up Time for TA-3120

Stereo integrated amplifier TA-3120 which have been in stock or not used for a long time, it takes several minutes to start operation after Power Switch is set on for the first time.

It is due to Electrolytic Capacitor in the Muting Relay Circuit which serves to give proper time-lag (usually 6—7 seconds) to the Amplifier.

When Electrolytic Capacitor is left unused, leakage current value increases and it takes much more time than usual for Electrolytic Capacitor to charge up to normal voltage.

It gives no affect to the natural performance of Amplifier itself.

Upon the reports so far received and the result of investigation, attention should be paid to the following points.

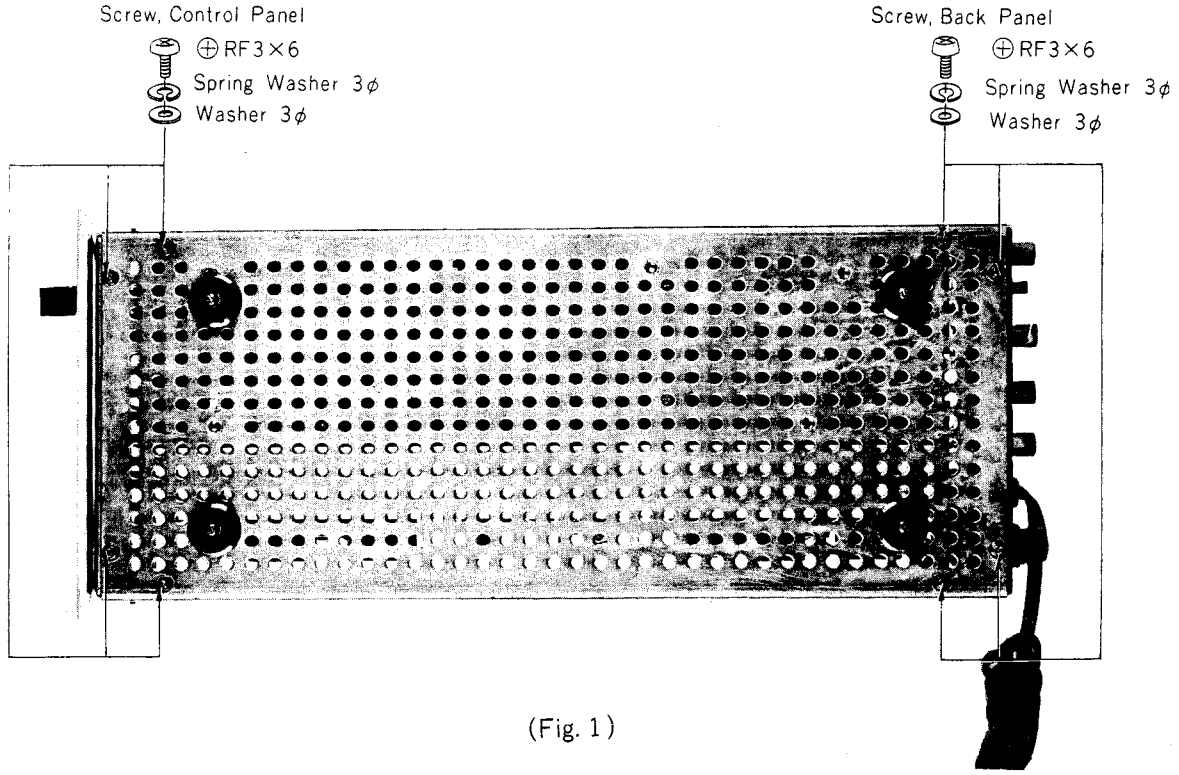
1. It dose not engender excessive time-lag to leave the unit unused for about one month.
2. It takes 2 or 3 minutes at longest to start operation, however only one set took 10 minutes in very rare case.

We hope you will take this phenomena in throughly, especially when you set Power Switch on in customer's presence for the first time.

Notes:

To simplify the discussions, only Channel "1" be described. Channel "2" is identical.

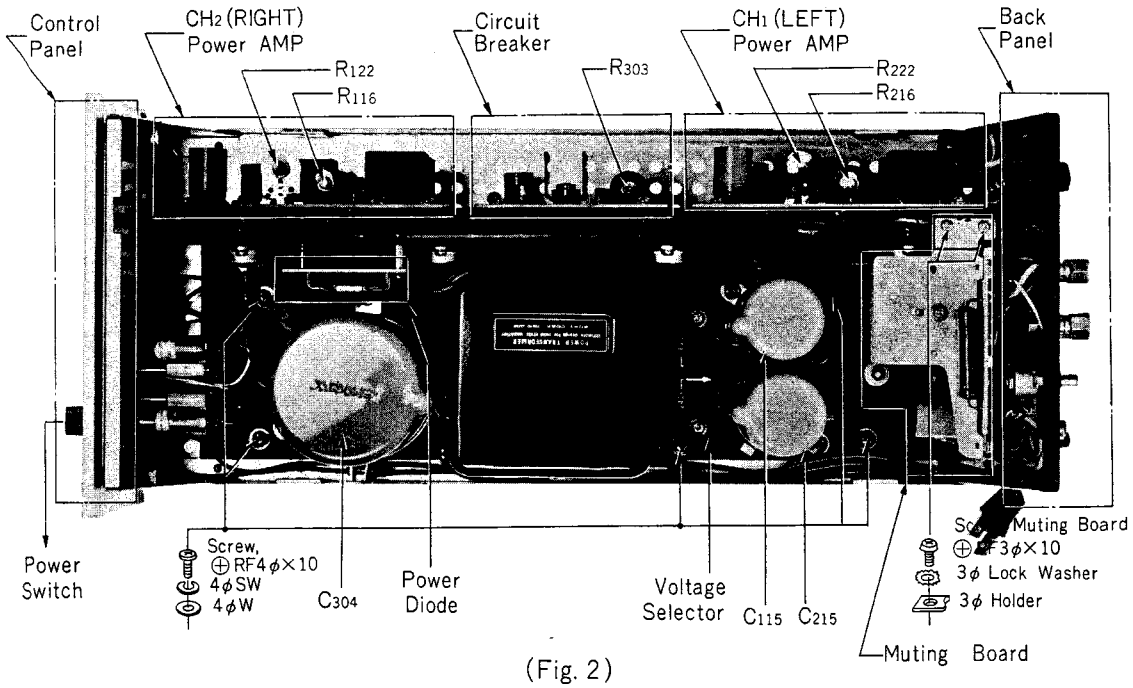
Method of Disassembling the Set



(Fig. 1)

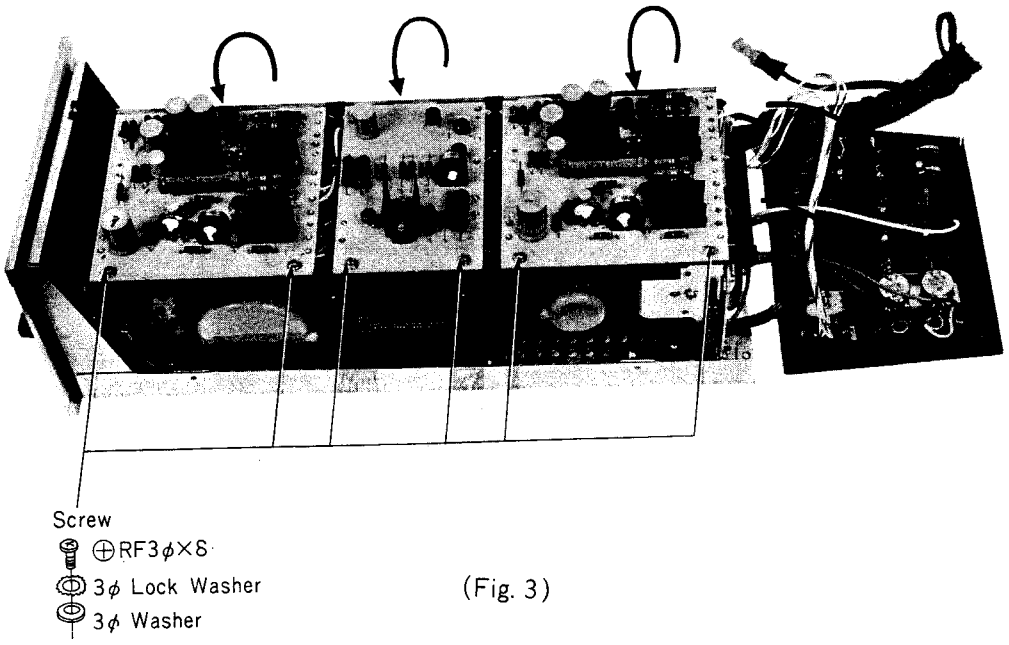
Removal of power amplifier and power supply block.

(a) Remove the four machine screws from both side of the cabinet to take off the chassis cover, then remove the four screws from the bottom of the chassis to release the back panel section as shown in fig. 1.

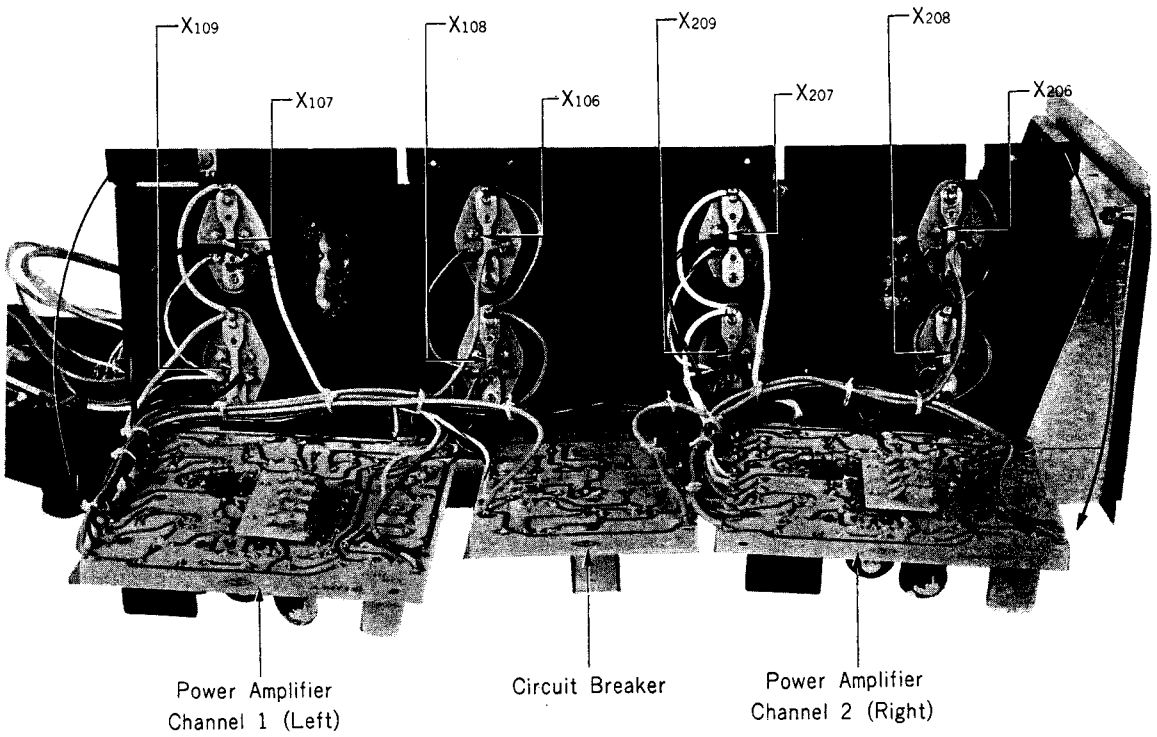


(Fig. 2)

(b) Remove the five screws, RF 4φ×10 from chassis, fig.2, so you can turn that block to make the circuit board up as shown in fig. 3.



(Fig. 3)



(Fig. 4)

(c) In checking the circuit board, removal of screws, RF 3φ×8, is recommended for your convenience, as shown in fig. 3, fig. 4.

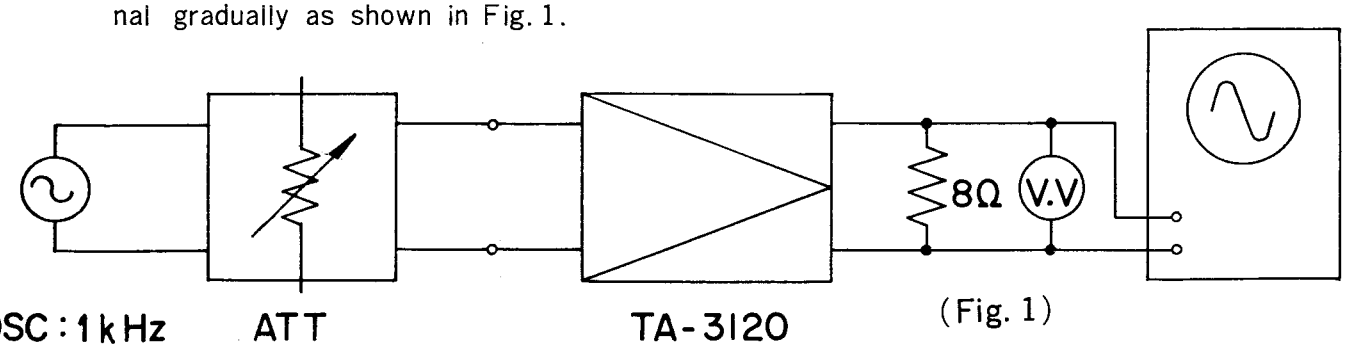
ADJUSTMENT

Preparation for adjustment

*Voltage Selector Plug :	Insert the Plug so that the top arrow mark of the plug points to the proper voltage figure.
*DC Balance Control (R122, 222) :	Turn clockwise to the full.
*Compensation Diode :	Check that the Diode is attached to heat sink.
*Load for output :	Connect an 8 ohms/50w resistor instead of Speaker.
*Fuse :	Set a 5A Fuse.

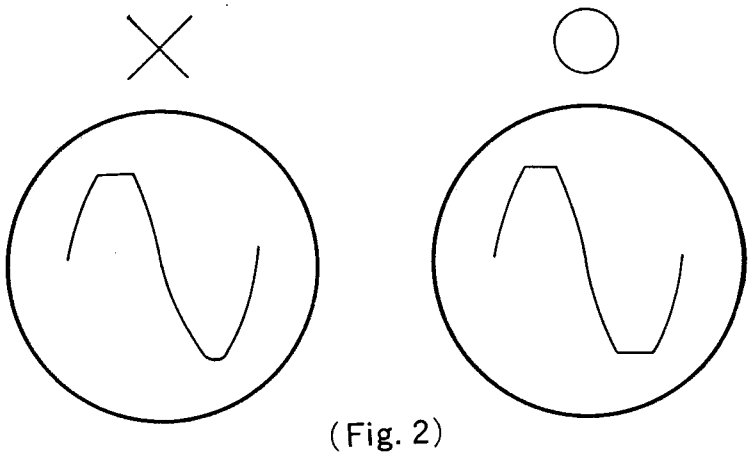
(A) AC Balance Adjustment

1. Connect an oscilloscope and V.T.V.M. across the 8 ohms load resistor.
2. Feed an 1 kHz signal to the input terminal through the attenuator and increase the signal gradually as shown in Fig. 1.



(Fig. 1)

3. When the wave form on the oscilloscope is slightly clipped, adjust 50K ohms potentiometer (R116, 216) so that the both upper side and lower side of wave form are clipped at the same time as shown in Fig. 2.



(Fig. 2)

4. Make the above procedures on both channels.

(B) Current Adjustment at Zero Signal

1. Adjust the input signal to zero (less than −59 dBs.)
2. Connect voltmeter (multitester) across the 0.5 ohms resistor (R135, 136, 235, 236).
3. Adjust the 200 ohms adjustable resistor (R122, 222) to obtain 25mV reading on the Voltmeter.
4. Repeat the above (A) adjustment.

(C) Circuit Breaker Adjustment

Make it a rule to adjust the circuit breaker block after repairing it, before connect it to amplifier.

1. Turn the 200 ohms adjustable resistor (R301) counterclockwise to the full.
2. Supply DC 2V ±0.02V through D15 and D16 respectively.
3. Supply 85V between B+ and E.
4. Connect the voltmeter across the B-out and E.
5. Turn the 200 ohms adjustable resistor (R301) clockwise, and fix it when the voltmeter indicates 0V on the dial.

The Other Items for Confirmation :

1. The operation time of relay will be less than 15 sec., at first, and the next time it will be less than 10～4 sec. after power switch is on, turned. The difference of time between channel "1" and channel "2" should be less than 10 sec.
2. Phase of both channels must be same.
3. The difference of output level between channel "1" and channel "2" must be less than 2 dB., when the input level control knob set to maximum level position.
4. Output level should be decreased to 0 with the input level control knob.
5. When short circuit of the speaker output, the circuit breaker must work perfectly.

A

- No sound
  - Power Lamp does not light. Safety Lamp does not light.
    - Fuse is normal.
      - Defective Micro Switch S1-1
      - Broken A.C Cord(Defective Plug)
      - ...kage o... ...se contact of two Pilot Lamps.
      - Defective Power Transformer(Primary or Secondary Winding)
      - Open DS-2M.
      - Defective Voltage Selector
    - Fuse is blown.
      - 1. Set Power Switch off
        2. Measure the resistance between +B and ground across C304 at low resistance range.
        - Low resistance (less than 50Ω)
          - Check the resistance between Collector and Emitter of X106
          - Defective of C304
          - Short-circuit of lead
        - Approx. 100Ω
          - Layer short-circuit in Power Transfo (Primary or Secondary Winding)
          - DS-2M short
      - Defective Fuse
  - Power lamp does not light. Safety Lamp lights.
    - Open lead or loose contact of Power Lamp
  - Power Lamp lights. Safety Lamp does not light.
    - Disconnection of lead or loose contact of Safety Lamp.
  - Normal (Power Lamp lights. / Safety Lamp lights.)
    - After 7 or 8 seconds.
      - Relay does not click.
        - Deftective Muting Circuit
          - Measure voltage across Relay Coil.
      - Relay clicks.
        - As soon as Relay clicks, safety Lamp goes out
          - Short-circuit in Speaker
            Short-circuit at Speaker terminal
            Extremaly small Speaker impedance
          - Check DC voltage at each section
            - Broken (

B

- Excessive hum noise
  - DC voltage normal
    - Defective C304
    - AC power line is placed near input circuit for X101
  - DC voltage less than 80V
    - DS-2M open.

C

- Hash noise
  - Defective X101 or X102
  - Defective R102, R103, R108 or R104
  - Excessive Current leak of C103, C104, C105

D

- Vibration of transformer
  - Replace
  - Tight the loose screws

E

- Noise is heard when power switch turned off
  - Defective S1-2 or relay
    - Replace S1-2 or adjust the relay

F

- Safty lamp goes out when sound volume is increased
  - Adjust R301
  - Load impedance is less than 8 ohms

G

- Sound is not heard simultaneously through both right and left speakers
  - Defective relay
    - replace relay or repair muting circuit

H

- Cabinet is abnormally hot.
  - Open diode D1~5
  - Unsuitable bias setting of X106, X107, X108, X109, at nosignal

I

- Intermittent sound
  - Open circuit, cold soldering
  - Bimetalic effect of X101, X102

- Defective Micro Switch S1-1
- Broken AC Cord(Defective Plug)
- Skage or Jse contact of two Pilot Lamps.
- Defective Power Transformer(Primary or Secondary Winding)
- Open DS-2M
- Defective Voltage Selector
- 1. Set Power Switch off
  2. Measure the resistance between +B and ground across C304 at low resistance range.
  - Low resistance (less than 50Ω)
    - Check the resistance between Collector and Emitter of X106~X109
      - Extremely small (Less than 30Ω) — Defective Transistor(X106~X109) Short between Collector and Emitter. Open lead of Diode (D18~D21)
        Note: After replacement, check the resistance as to R241, 237, 238, 222, 221, 240, 239, 220.
      - Normal (Not less than 50Ω) — Defective X301 and X302 (Short-circuit between Collector and Emitter)
    - Defective of C304
    - Short-circuit of lead
  - Approx. 100Ω
    - Layer short-circuit in Power Transformer (Primary or Secondary Winding)
    - DS-2M short
- Defective Fuse
- Relay does not click. — Deftective Muting Circuit — Measure voltage across Relay Coil.
  - Less than 20V
    - Defective Relay(Short-circuit)
    - Disconnection of lead between Base and Emitter of X303
    - Defective S1-2(Short-circuit)
    - Defective C303
    - Check the resistance of R313
  - High Voltage — Relay Coil Open
- Relay clicks. — As soon as Relay clicks, safety Lamp goes out
  - Short-circuit in Speaker
    Short-circuit at Speaker terminal
    Extremaly small Speaker impedance
  - Check DC voltage at each section
    - Broken Copper foil on the circuit board pattern.
    - Hot lead of C115 to ground.
      - High (more than 38.2V) — Open lead between Collector & Emitter or Base & Emitter of X103
      - Low (less than 38.2V) — Defective C110 or 107 (short-circuit or leak)
    - High collector voltage of X102 — Defective X102 Open-circuit between Collector & Emitter
    - Low emitter voltage of X101 — Defective X101 Open-circuit between Base & Emitter

F

Safty lamp goes out when sound volume is increased
- Adjust R301
- Load impedance is less than 8 ohms

G

Sound is not heard simultaneously through both right and left speakers — Defective relay — replace relay or repair muting circuit

H

Cabinet is abnormally hot.
- Open diode D1~5
- Unsuitable bias setting of X106, X107, X108, X109, at nosignal

I

Intermittent sound
- Open circuit, cold soldering
- Bimetalic effect of X101, X102

*Remarks

Bimetalic effect is a phenomena which makes the loose contact inside of transistor especially in 2SC401

How to Check : Heat the transistor(X102 or X103) with the blower as shown in Fig. 1, about 212°F (100°C).
If the sound intemitts at the peak volume, that transistor is defective because of bimetalic effect.

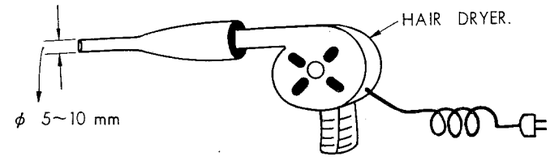
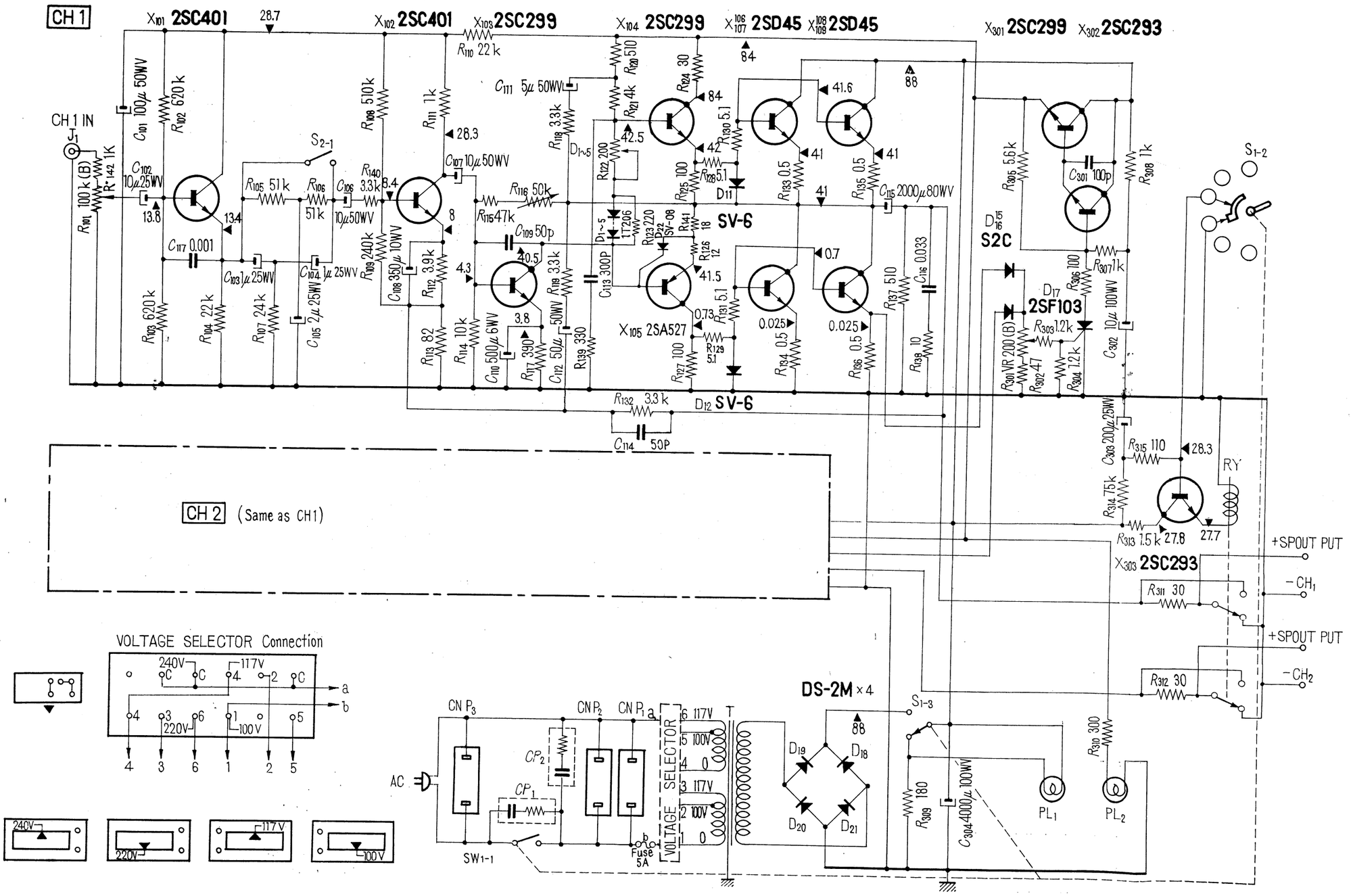


Fig. 1 Blower

TROUBLESHOOTING CHART FOR TA—3120.

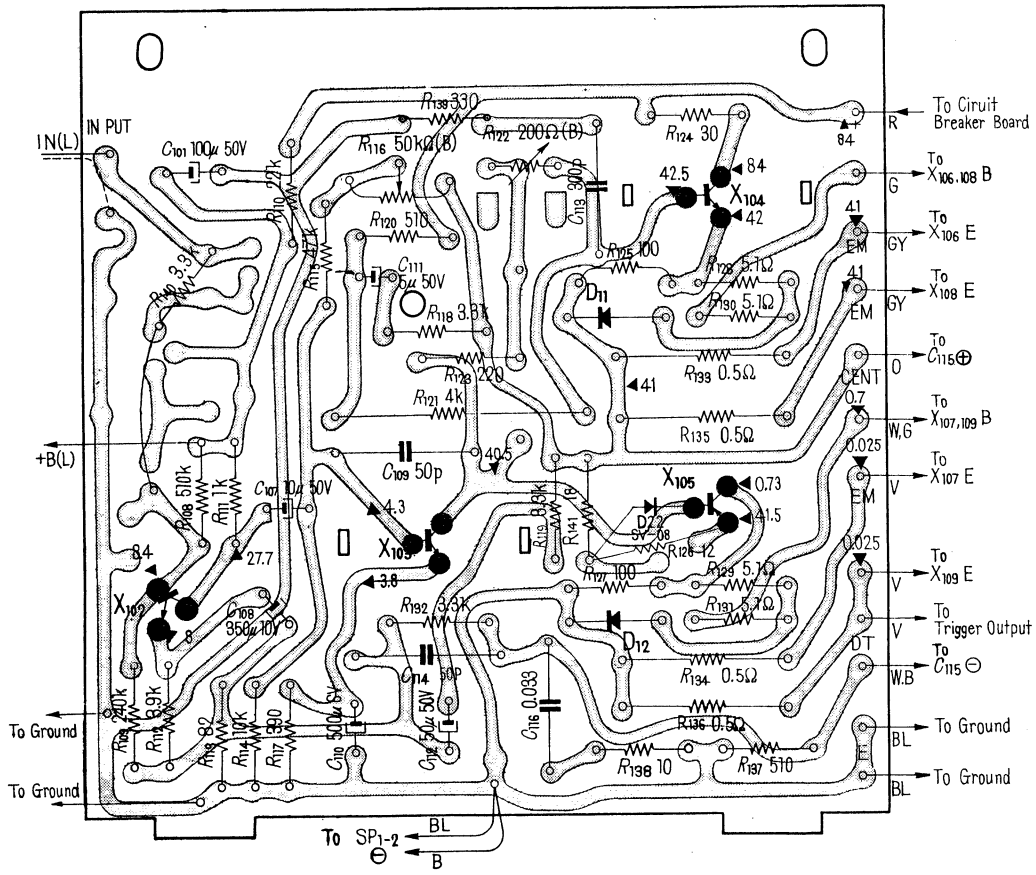
Schematic Diagram of TA—3120



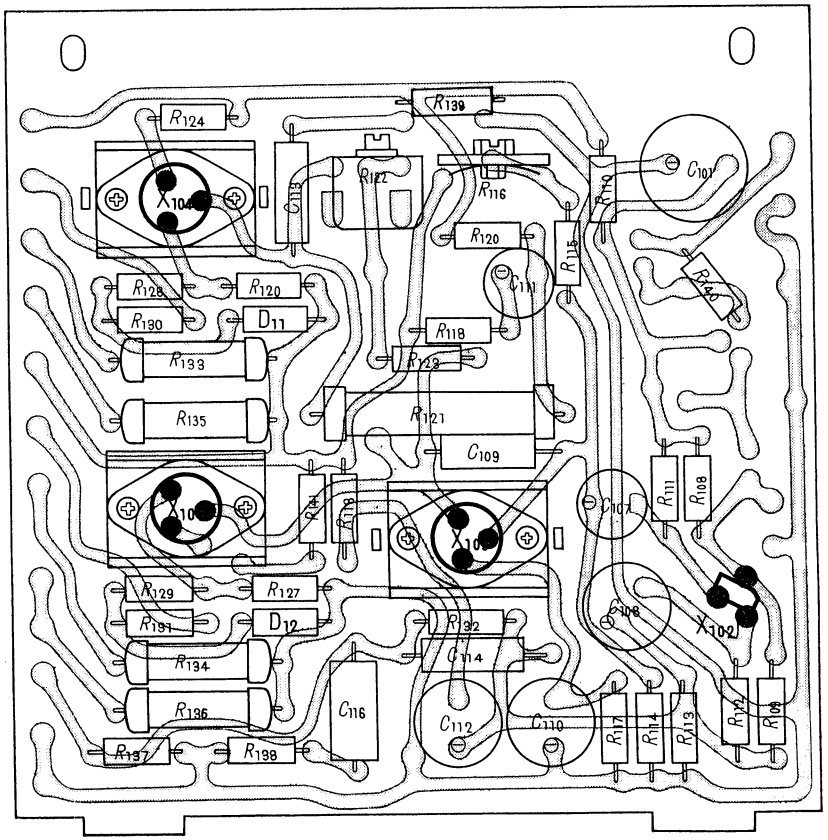
The voltages shown above are at zero signal

Power Amplifier Section

—Conductor Side—

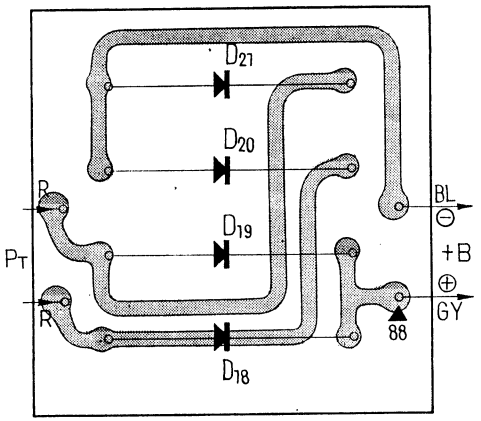


—Components Side—

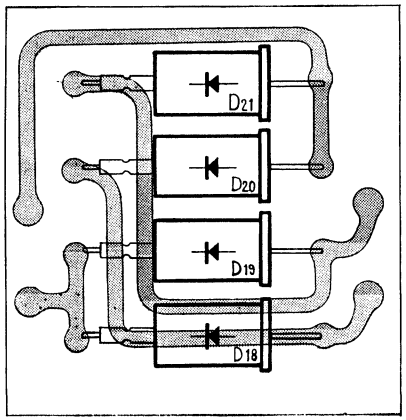


Rectifier Section

—Conductor Side—

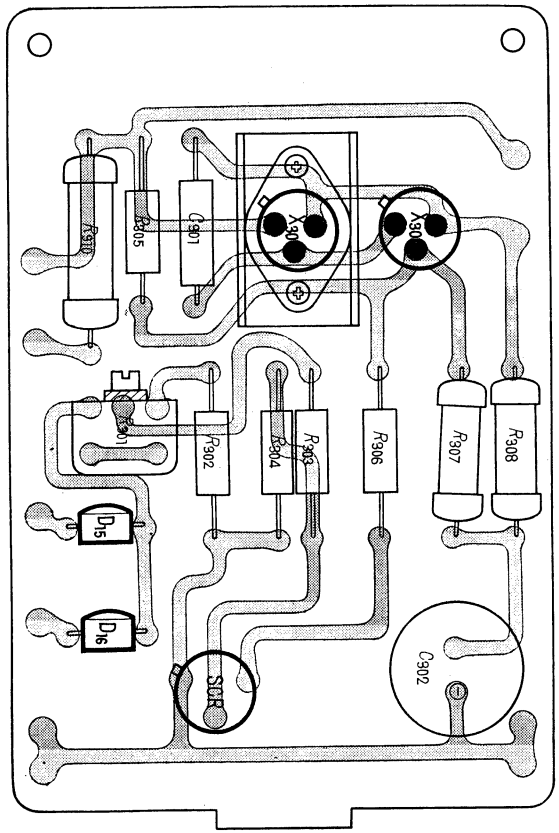


—Components Side—

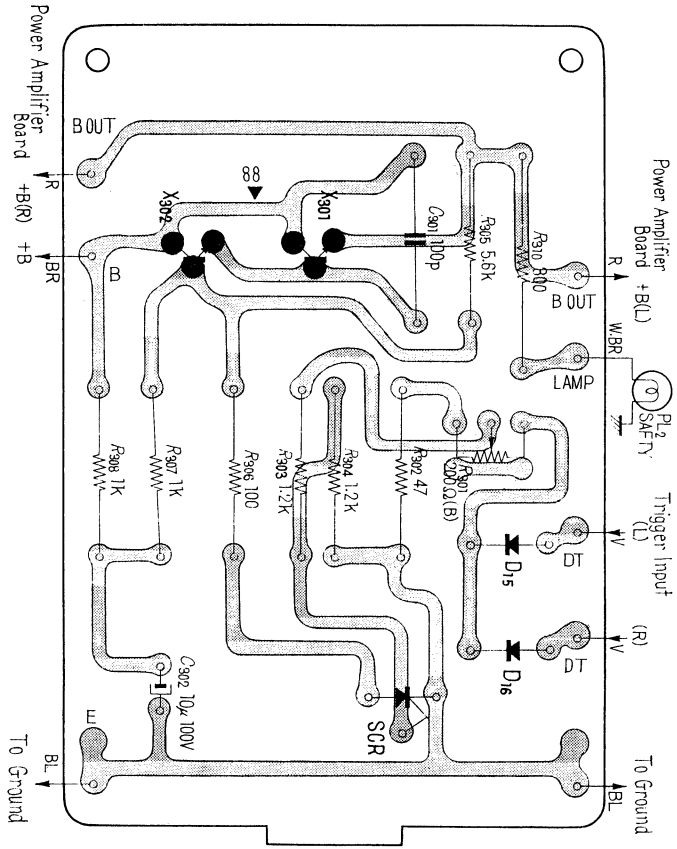


Circuit Breaker Section

—Components Side—



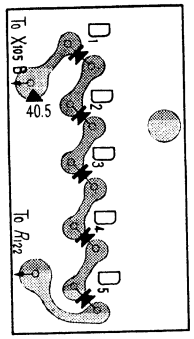
—Conductor Side—



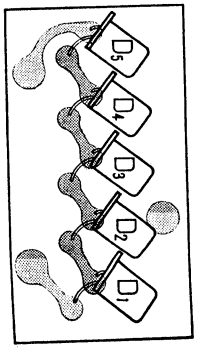
Thermo Compensaton

Diodes

—— Conductor Side ——

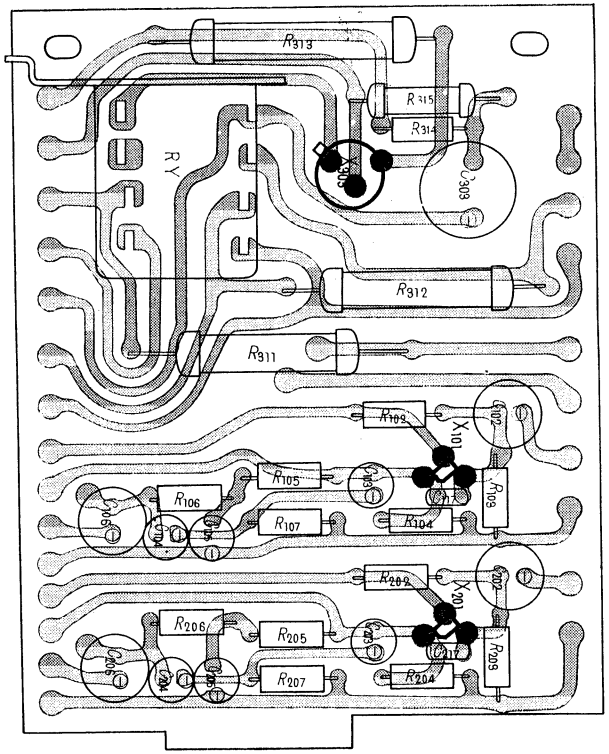


—— Components Side ——

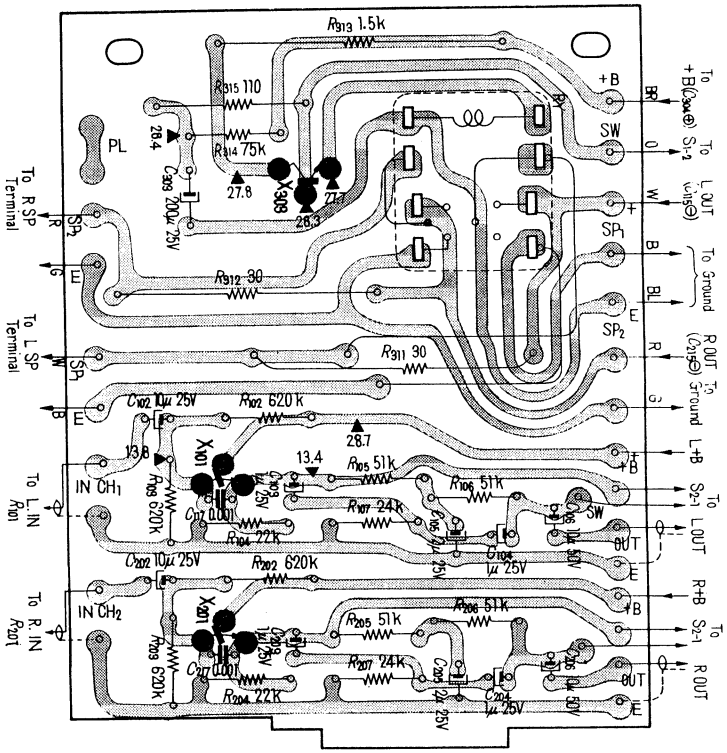


Muting and Emitterfollower Section

—Components Side —



—Conductor Side—



Mechanical Ports

Part No.	Description	Q'ty
X-20321-01	Panel Ass'y, chassis; front	1
X-20321-02	Plate Ass'y, chassis; bottom	1
X-20321-03	Panel Ass'y, front	1
2-032-103-	Panel, front	(1)
2-031-956-	Escutcheon, pilot lamp	(2)
-955-01	Lens, pilot lamp; red	(1)
-955-02	Lens, pilot lamp; green	(1)
X-20299-05	Terminal Ass'y, speaker output; middle type	4
X-20299-06	Chassis Ass'y, power amplifier	1
X-20319-01	Terminal Ass'y, earth; small type	4
2-032-111-	Cabinet cover; black	1
-112-	Plate, jack	1
-113-	Label, specification (E)	1
-114-	Cushion, styro-foam	2
-116-02	Carton	1
-117-	Plate, control panel protect; PVC	1
2-029-953-	Label, voltage	1
2-029-924-	Plate, relay	1
-925-	Plate, volume control	1
-928-	Heat Sink; aluminium	7
-930-	Screw, cabinet cover	4
-931-	Knob, power on/off; dark brown	1
-933-	Case Cover, relay; white	1
-935-02	Spacer, speaker output; blue	2
-935-12	Rpacer, speaker output; red	2
-936-	Spacer, speaker output; fiber	4
-938-	Plate, printed circuit board	6
-939-	Cover, electrolytic capacitor; large	1
-940-	Cover, electrolytic capacitor; middle	2
-943-	Cushion	1
-950-	Spacer t=0.5	1
-951-	Plate, nut	1

Part No.	Description	Q'ty
0-051-263-	Foot, rubber	4
3-701-030-	Label, serial number	1
3-002-408-05	Spacer, 6 ϕ	2
-408-15	Spacer, 6 ϕ	2
0-041-109-	Bag, polyethylene	1
3-410-032-	Stopper, ac cord; black	1
3-790-707-11	Instruction Manual (E)	1
3-793-009-11	Tag, inspection	1
1-506-105-01	Plug, RCA pin; red	1
-02	Plug, RCA pin; black	1
X-44900-02-1	Cloth, polishing	1
2-029-946-	Bag, accessory; polyethylene	1
3-793-041-11	Sheet, check	1
3-701-020-	Bag, polyethylene	1
7-491-001-	Desiccant	1
7-621-261-43	Screw, machine +RF 3 ϕ×6	28
-53	〃 , 〃 +RF 3 ϕ×8	8
-63	〃 , 〃 +RF 3 ϕ×10	12
-73	〃 , 〃 +RF 3 ϕ×12	18
7-621-268-53	〃 , 〃 +RF 4 ϕ×8	9
-83	〃 , 〃 +RF 4 ϕ×14	4
-770-50	〃 , 〃 +B 2.6 ϕ×6	2
-39	〃 , 〃 +B 3 ϕ×8	8
-561-53	〃 , 〃 +K 3 ϕ×8	1
-999-01	〃 , hexagonal head 3 ϕ×8	4
7-623-108-12	Washer, plain 3 ϕ (middle)	33
-22	〃 , 3 ϕ (large)	4
-110-12	〃 , 4 ϕ (middle)	4
-208-24	〃 , spring 3 ϕ	31
-210-24	〃 , spring 4 ϕ	5
-408-04	〃 , lock 3 ϕ	50
7-622-108-02	Nut 3 ϕ	41
-208-02	Nut, lock 3 ϕ	4
7-623-508-01	Lug 3 ϕ	6

Electrical Parts

Part No.	Descriptino	Q'ty
X-20321-53-	Circuit Board, power amplifier: mounted	2
-55-	Circuit Board, muting; mounted	1
-56-	Circuit Board, circuit breaker; mounted	1
-58-	Circuit Board, thermo compensation diode; mounted	2
-57-	Circuit Board, power supply diode; mounted	1
1-441-227-	Transformer, power	1
1-513-293-12	Switch, power on/off	1
-091-	Switch, slide	1
1-515-050-11	Relay	1
1-507-142-	Jack, input; RCA pin	1
1-536-151-	Terminal Strip 4P	1
1-509-015-	Socket, ac	3
1-533-012-	Fuse Post	1
1-532-017-	Fuse 5A	1
1-517-021-11	Socket, pilot lamp	2
1-518-050-12	Lamp, pilot	2
1-534-241-14	Cord, ac power	1
1-526-502-11	Socket, transistor 2SD45	8
-165-11	Socket, voltage selector	1
1-538-348-12	Circuit Board, power amplifier; printed	2
-352-11	Circuit Board, muting; printed	1
-344-11	Circuit Board, circuit breaker; printed	1

Part No.	Description	Q'ty
1-538-345-11	Circuit Board, thermo compensation diode; printed	2
-346-11	Circuit Board, power supply diode printed	1
	Semi-Conductors	
	Power Amplifier Section	
	Transistor 2SC401 X102,202	2
	〃 2SC299 X103,104,203,204	4
	〃 2SA527 X105,205	2
	〃 2SD45 X106-109, X206-209	8
	Varistor SV-6 D11-14	4
	〃 SV-08 D22,23	2
	Muting Section	
	Transistor 2SC293 X303	1
	〃 2SC401 X101,201	2
	Circuit Breaker Section	
	Transistor 2SC299 (Red Mark) X301	1
	〃 2SC293 (Red Mark) X302	1
	Diode S2C(FR-1U) D15,16	2
	〃 2SF-103 D17	1
	Thermo Compensation Diode Section	
	Diode 1T206 D1~10	10

Part No.	Description	Q'ty
	Power Supply Diode Section	
	Diode DS-2M D18~21	4
	Resistors	
	General Items	
1-221-707-	Potentiometer 100K ohms (B) R101,201	2
1-205-100-	Enameled 180 ohms 10W R309	1
1-201-021-	Composition 1K ohm RC1/2 R142,242	2
	Power Amplifier Section	
	Composition	
1-201-837-	510K ohms RC1/2 ±10% R108,208	2
-087-	22K " " " R110,210	2
-843-	240K " " " R109,209	2
-683-	82 " " " R113,213	2
-085-	3.9K " " " R112,212	2
-021-	1K ohm " " R111,211	2
-041-	10K ohms " " R114,214	2
-472-	390 " " " R117,217	2
-054-	47K " " " R115,215	2
-084-	3.3K " " " R118,140,218,240	4
-845-	510 " " " R120,137,220,237	4
-100-	100 " " " R125,127,225,227	4
-838-	30 " " " R124,224	2
-094-	10 " " " R138,238	2
-081-	220 " " " R123,223	2
-794-	5.1 " " " R130,128,131 129,230,228, 231,229	8
-082-	330 " " " R139,239	2
1-203-058-	Carbon 3.3K ohms RD1/4L ±5% R119,132,229,232	4
1-221-334-	Adjustable 50K ohms(B) R116,216	2
1-223-010-	Adjustable, wire wound 200 ohms(B) R122,222	2
1-209-576-	Carbon 4K ohms RD2L ±5% R121,221	2
1-207-151-	Wire wound 0.5 ohms 1.5W ±10% R133,134,135,136,233,234,235,236	8
1-203-459-	Carbon 18 ohms RD1/4L ±5% R141,241	2
1-204-416-	Carbon 12 ohms RD1/4L ±5% R126,226	2
	Muting Section	
1-207-104-	Wire wound 30 ohms 4W ±10% R311,312	2
-153-	1.5K ohms 4W ±10% R313	1
-152-	110 ohms 1.5W ±10% R315	1
1-201-844-	Composition 75K ohms RC1/2 ±10% R314	1
-842-	620K " " " R102,103,202, 203	4
1-201-087-	22K ohms RC1/2 ±10% R104,204	2
-282-	24K ohms RC1/2 ±10% R107,207	2
-283-	51K ohms RC1/2 ±10% R105,106, 205,206	4
	Circuit Breaker Section	
	Composition	
1-201-079-	47 ohms RC1/2 ±10% R302	1
-685-	1.2K " " " R303,304	2
-086-	5.6K " " " R305	1
-110-	100 " " " R306	1
1-223-010-	Adjustable, wire wound 200 ohms(B) R301	1
1-207-157-	Wire wound 1K ohm 1.5W ±10% R307,308	2
-156-	300 ohms 3W ±10% R310	1
	Capacitors	
	General	
1-121-323-	Electrolytic 4000μF 100WV C304	1
-327-	" 2000μF 80WV C115,215	2
1-101-534-	Encapsulated Component 120 ohms +0.1μF 500WV	2
	Power Amplifier Section	
1-121-172-	Electrolytic 100μF 50WV C101,201	2
-143-	" 10μF 50WV C107,207	2
-140-	" 350μF 10WV C108,208	2
-161-	" 500μF 6WV C110,210	2
-163-	" 50μF 50WV C112,212	2
-142-	" 5μF 50WV C111,211	2
1-109-001-	Mica 50pF 1KV±10% C109,209, 114,214	4
-006-	" 300pF 1KV±10% C113,213	2
1-105-679-	Mylar 0.033μF 50WV±10% C116,216	2
	Muting Section	
1-121-190-	Electrolytic 200μF 25WV C303	1
-179-	" 10μF 25WV C102,202	2
-324-	" 1μF 25WV C103,104, 203,204	4
-325-	" 2μF 25WV C105,205	2
-143-	" 10μF 50WV C106,206	2
1-105-661-	Mylar 0.001μF 50WV ±10% C117,217	2
	Circuit Breaker Section	
1-121-126-	Electrolytic 10μF 100WV C302	1
1-109-002-	Mica 100pF 1KV ±10% C301	1

Following parts are added to UL and CSA respectively

Part No.	Description	Q'ty
	UL	
2-032-130-	Label, specification	1
3-422-204-	Label, caution	1
2-029-955-	Plate, ac outlet	1
3-790-707-22	Instruction Manual (UL)	1
2-032-118-	Master Carton for 2 sets	1/2
1-534-330-31	Cord, ac power	1
1-513-293-22	Switch, power on/off	1
1-209-866-	Resistor, carbon 1 ohm 1W R133,233,134,234,135,235,136,236	16
	CSA	
2-032-128-	Label, specification	1
2-029-966-	Plate, ac outlet	1
3-407-956-	Label, caution	1
3-790-707-22	Instruction Manual	1
1-534-330-31	Coard, ac power	1